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SUBJECT: Electricity - Economy's Driver or Achilles Heel?

REF: A) 09 Pretoria 1762; B) 09 Pretoria 179

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Summary  
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**¶1.** (SBU) South African power utility Eskom is struggling belatedly to increase capacity to meet demand, while working to engage the private sector, secure financing, and correct its pricing to reflect market realities. The utility suffered an electricity supply emergency, resulting in rolling blackouts and repeated load shedding, from January through April 2008. While failure to meet demand with supply had a significantly negative effect on the economy, the global slow-down has given Eskom a temporary demand-side reprieve. As owner and operator of the national electricity grid, Eskom is the designated "gatekeeper" for all potential market entrants and independent power producers (IPPs). Following the 2008 crisis, the utility has announced that it will require a capital outlay of \$52 billion for new generation capacity and an ambitious and controversial tariff increase of about 45 percent yearly through 2012 to service this capital. 90 percent of Eskom's electricity is currently derived from coal combustion. To date, the utility has made little progress in integrating alternative sources of nuclear and renewable energy. Challenges include: a shortage of coal, increasing demand related to global economic recovery, energy intensity in key industries such as mining, and the need to mitigate the increasing carbon load of coal-fired electricity. End Summary.

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Eskom's Monopoly  
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**¶2.** (U) South African State utility Eskom dominates electricity generation. It supplies some 95 percent of South Africa's, and about 45 percent of Africa's, electric power. It also owns and operates the national electricity grid. If and when South Africa attracts independent power producers (IPPs), Eskom is also the designated purchaser of electricity. Eskom is among the world's top seven in generating capacity, and among the top nine in terms of sales. Coal-fired power stations generate 90 percent of South Africa's electricity. A 1800 MW nuclear station at Koeberg near Cape Town accounts for 4 percent, and hydroelectric, pumped storage, and gas/kerosene-fired plants provide the remaining 6 percent.

¶3. (SBU) Long-term underinvestment in power supply, exacerbated by cheap prices and an unwillingness or inability to engage/attract private investors, culminated in a sudden and severe power crisis in early 2008 in South Africa and the region. Shortage of supply was so dire on January 25, 2008 that the system was at risk of total blackout. An alarming admission from Eskom: a system-wide blackout of the national grid could require three weeks to restore power. In January, South Africa's critical mining sector was shut down for five days and reopened at a mandated 90 percent provision of power. Eskom imposed rationing, rolling blackouts, and repeated daily load shedding -- a last-resort measure of interrupting load to certain customers, undertaken to maintain the stability of the grid and prevent a system-wide blackout -- between January and April 2008. The immediate cause of the emergency was that a large percentage of Eskom's existing capacity was unavailable for supply, due to planned maintenance, unplanned breakdowns, and reduced output linked to coal supply problems. Together these factors contributed to a situation in which some 20 percent of the country's generation capacity was out of service at one time. As South Africa's surplus electricity capacity had been depleted, and Eskom's reserve margin - the spare power plant available when the highest demand of the year is recorded - had fallen to 5-7 percent, the electricity utility was unable to meet demand. The internationally accepted standard reserve margin for a country is between 15 and 20 percent. At the same time that the South African Government and Eskom failed to increase investment in supply, they had the political mandate to increase access to the population since 1994.

¶4. (SBU) Since the power outages and economic disruptions of early

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2008, electricity supply has become more stable. Eskom has recently described the electricity system as "tight but manageable". The utility has increased its coal stockpiles at power stations from less than 12 days' supply to greater than 40 days' supply, brought on new capacity of 4,450 MW since January 2008 (a combination of "de-mothballed" older plants and some new gas-fired generation), and expanded the reserve margin to just under 10 percent. Nonetheless, other contributors to the crisis, such as policy uncertainty, planning confusion, delayed investment in new generating plants, and regulatory impediments to attracting private investment, continue to contribute to a restricted supply.

¶5. (SBU) Officials are concerned that South Africa, which is hosting the 2010 football World Cup, may not have enough electricity to go around. The capacity-stressed situation has forced Eskom into a planned spend of R385 billion (52 billion U.S. dollars) over the next five years to increase capacity from 40,000 MW up to 70,000 MW.

The planned program includes the development of new capacity, the continued recommissioning of mothballed capacity, and the refurbishment of existing operating capacity, across a range of generation platforms. The company's new project pipeline comprises primarily immense coal-fired baseload facilities. Some more modest gas-fired and pumped storage peaking facilities, renewable facilities, and the refurbishment of existing plants are also included. 9,600 MW of new baseload capacity is planned from two new coal-fired power stations - Medupi and Kusile. Medupi, situated near Lephalale in South Africa's Limpopo province, will be a six-unit power station. Kusile, to be situated near Eskom's existing Kendal power station in the Mpumalanga province, will be a six-unit mine-mouth power plant. Each of these power stations will have an output of about 4,800 MW. Medupi and Kusile are planned to be fully commissioned and operational by 2016 and 2017, respectively, but some units will come on stream as early as 2012-13, intended to abate the power crisis, while increasing dependence on coal.

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From Cheap to Costly

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¶6. (SBU) Eskom is striving to implement controversial and

significant tariff increases to cover operational and capital costs.

In order to fund its capital program, it has already implemented 27.5 and 31.3 percent increases in 2008 and in July 2009, respectively. In October 2009, the utility applied to the National Energy Regulator of South Africa (NERSA) for further increases of 45 percent per year for the next three years. It is not clear how long-term contracts with mining and other interests, often linked to commodity prices and locking in prices well below the proposed rates over time, will be handled.

**¶7.** (U) It is unlikely that consumers and interest groups will accept price hikes graciously. One journalist commented, "Has the power giant gone stark raving mad?" According to parliamentary testimony by Eskom CEO Jacob Maroga on October 6, Eskom proposed an increase in the allocation of free basic electricity (FBE) in their tariff increase application as a way of shielding the poor from substantial hikes in electricity prices. Under the FBE intervention, 50 kWh/m of free electricity would be provided to households with an income of less than R800 (\$111) per month.

**¶8.** (U) Eskom ranked as one of the four cheapest electricity producers in the world until the July increase. The requested increases would take the power utility from an electricity price of 4.47 (U.S.) cents per KWh in 2007 to around 7.80 cents per KWh in **¶2010**. This would put the price in the same range as developed countries like Canada and Sweden. The electricity cost in the United States in 2010 is likely to be above 10 cents per KWh.

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Low Prices, High Environmental Cost

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**¶9.** (SBU) Coal-fired power may be historically cheap, but it has high environmental costs in terms of carbon emissions, particulates (air quality), and the need to use scarce water supplies for cooling. These costs do not appear to have been taken into account by policy makers or by Eskom. Nonetheless, investment in alternatives could be spurred once pricing is adjusted.

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Post Recession Demand Spike?

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**¶10.** (SBU) The global recession has alleviated power demand temporarily. In particular, many energy-intensive smelters have shut down in response to a drop in world demand for metals and alloys. Prior to the recession, Eskom had based its supply and demand projections on a robust power-demand growth of 4 percent a year and annual economic growth of 6 percent. This would have required doubling of the generation system to nearly 80,000 MW by 2025 to keep pace with demand and build an acceptable reserve margin of at least 15 percent. The recession, however, has caused a number of Eskom's key industrial customers to adjust their outputs (or shut down), and as a consequence, Eskom has re-assessed its demand scenarios. The utility is currently assuming "marginal" to zero growth in electricity demand for 2009 and 2010. Eskom now expects the system will need a 60,000 to 70,000 MW capacity by 2025. A more rapid market recovery, and related revival of mine production, could cause renewed shortages and force further planning revisions.

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Not Enough Coal to Burn

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**¶11.** (SBU) Coal shortage is a serious threat to SA electricity supply. South Africa currently produces about 250 million tons of coal a year. 48 million tons of capacity a year will be lost in the next ten years, as mines reach the end of their productive lives. Eskom's coal consultant Johan Dempers is quoted as saying that South Africa will need to commission as many as 40 new coal mines at a cost of some R110 billion (15 billion U.S. dollars) in order to meet the country's electricity needs by 2020.

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Independent Power Suppliers' Role  
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¶112. (SBU) The South African Government (SAG) has called for the private sector to play a greater role in power generation, but it and Eskom have been unable to deliver on this policy. IPPs are intended to generate 30 percent of the additional power capacity; doubts have been raised as to whether such a target will be met. As reported in Ref A, IPPs must have capacity of at least one Megawatt for renewable sources; reverse-metering by households and enterprises that have invested in solar panels or other renewable sources are not permitted or encouraged under current regulations. Individual IPPs proposing large power generation projects have been struggling to finalize purchase agreements with Eskom, including the large coal-fired Mmamabula project in Botswana that cannot be financed without an Eskom off-take agreement. Under current legislation, all power generated by IPPs has to be sold to Eskom. The power utility appears to have made little progress in encouraging or introducing additional players and to date has not negotiated any new Power Purchase Agreements (PPAs). In fact, Eskom has not signed a PPA since 1976, when the Cahora Bassa Dam hydroelectric project in Mozambique came on stream.

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Impact on South Africa's Neighbors  
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¶113. (SBU) South Africa values its relationships with and potential imports from other countries in the region. Eskom exports 5.7 percent of the power it generates to neighboring countries and has honored contracts and relationships with its neighbors despite the power crisis. Eskom imports 3.9 percent of its power from countries like Mozambique and the Democratic Republic of Congo (DRC) and owns subsidiaries in various African countries. Of these numbers, Eskom imports 1200-1500 MW annually from the Mozambique Cahora Bassa dam, but re-exports up to 900 MW transmitted on the Eskom grid back to the Moatal aluminum smelter in Mozambique, under the terms of a longstanding contract. The utility currently sells about 3,000 MW to Botswana, Mozambique, Namibia, Zimbabwe, Lesotho, Swaziland, and Zambia each year. Eskom has reported that its electricity supply accounts for 45 percent of Africa's power. It has pointed out that current and future imports could be severely jeopardized if exports of electricity from South Africa are restricted. To prevent any future crises, particularly during the 2010 World Cup, members of the Southern African Power Pool (SAPP) have agreed to provide support, although it is not clear how much they could help. These members include Mozambique, Angola, Botswana, Malawi, Namibia, the DRC, Swaziland, Tanzania, Zambia, and Zimbabwe.

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Increasing Nuclear Power  
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¶114. (SBU) Eskom cancelled its tender for new conventional nuclear power plants in December 2008, but the SAG reaffirmed its commitment to expanding nuclear power with government playing a greater role. The SAG is still formulating its nuclear power plant policy and plans, but they will be reduced from its ambitious policy of 2007 that targeted a fleet of up to 20,000 MW over 20 years.

¶115. (SBU) The Embassy has been advocating for Westinghouse as a supplier of new nuclear plants. Areva of France is the main competition. Another component of South Africa's nuclear strategy is the development of pebble-bed modular reactor (PBMR) technology - a reactor technology developed in Germany that uses graphite pebbles and very high temperatures to generate energy - as an option for future nuclear power generation. Construction of a demonstration PBMR at the Koeberg site, initially due to start in 2007, has been delayed. The estimated cost for the project is R14.5 billion (\$2 billion). To date the SAG has spent more than R8 billion (\$1.1 billion U.S.) on research and development. The U.S. Nuclear Regulatory Commission is working with South Africa on pre-licensing

of the new fourth-generation technology, and the USDOE is working with PBMR in a number of multilateral research fora.

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Opportunity for Renewable Sources?  
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116. (SBU) South Africa has been relatively slow to initiate renewable energy projects, despite the SAG pursuing a renewable energy target of 10,000 GWh by 2013. The National Energy Regulator Nersa's recent finalization of source-specific, preferential, renewable energy feed-in tariffs (Refit) may stimulate new investment in renewable energy projects. Eskom's managing director for corporate services Steve Lennon reports that the company is designing a R6 billion (\$830 million) pilot solar capture thermal plant in the Northern Cape and has restarted procurement for the construction of a wind farm. Each of these sources will be designed to contribute 100 MW to the grid.

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Comment  
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117. (SBU) As South Africa struggles with the impact of limited electricity supply and looming price escalation, the country is presented with a watershed opportunity to transform its power industry. This transformation could include: reducing reliance on coal, integrating new private IPP's, increasing the number of green suppliers and renewable sources, correcting the price structure, and reducing the carbon load. Getting the prices right will not be easy; it is not clear to what extent Eskom's prodigious tariff increase requests will survive economic and political hurdles. In this time of protests over service delivery, the inflation impact on the poor and on the economy will be significant. In the short term, the utility will have to deal with emissions issues at a time when the SAG is committing to mitigating its carbon footprint. The country's abandonment of luring industrial users with cheap electricity may impede its ability to fulfill its goal of greater in-country processing of mineral commodities to export at a higher added value.

118. (U) Opportunities for greater US-SA cooperation in alternative energy (nuclear and renewable) may become more attractive as Eskom Qenergy (nuclear and renewable) may become more attractive as Eskom tries to find different ways of securing future supply. There will also be opportunities for bilateral cooperation and advice as Eskom strives to finalize Power Purchase Agreements with IPPs, balancing build versus buy and cost and timing implications.

Gips